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HEALTH AS A HERITAGE

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HEALTH AS A HERITAGE

BY

RALPH E. BLOUNT

WALLER HIGH SCHOOL
CHICAGO

A heritage, it seems to me,
A king might wish to hold in fee.

— LOWELL

ALLYN AND BACON

BOSTON NEW YORK CHICAGO
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No 1

PREFACE

Health, Public and Personal was written to help pupils understand the functions of their bodies and to lead them to give proper care to their health. Pupils are taught to look at the subject from the point of view of their own hygienic habits and also from that of the community organization. There is one aspect of the subject, however, which it seemed better to leave for a separate volume. Hence this little book.

Much of good health or ill health is determined by what the child inherits from his parents. Children cannot attain an excellent state of body or mind unless they are born of good stock, with the possibilities of a vigorous physique and a high intelligence, free from the blighting influences of degeneracy and race-destroying disease. Therefore, if we would have healthy children, we must study inheritance, learn what qualities of parents are transmitted to offspring, discover or devise methods by which the evil factors can be avoided and the good promoted.

Fifteen years ago the writer of *Health as a Heritage*, after several experimental trials, began giving to his classes in physiology and hygiene, as part of their regular work, the lessons which are here presented in book form. At first the lessons were given as lectures; but in this as in other subjects, the lecture method proved ill adapted to pupils of Junior High School age. Then the lessons were printed without illustrations. The teacher was driven to use the blackboard and stereopticon to make clear the anatomical references. A later edition of the lessons included illustrative figures.

Now, after years of experience, the author has rewritten the text and included in it discussions of the most important of the scores of topics which the pupils ask about. In fact there is not a topic discussed in these pages which is not commonly called up by the pupils in class discussion. Thus the book is made to meet the needs of the inquiring minds of the boys and girls.

The degree to which the lessons meet the approval of the pupils and their parents is shown by the voluntary expressions of gratitude received, by the eager questions with which the pupils would prolong the class hour, and by the improved moral tone of the pupils who have the lessons. Also, to test out the pupils' reaction, we have a number of times asked them to express, in an unsigned ballot, their opinion of the value of the lessons or to tell whether we should give them to the classes coming next year. The votes, almost unanimous, have been that the lessons are valuable (many pupils say the most valuable of all their work) and should be given to the new pupils.

The illustrations of the book are newly designed and drawn by an expert illustrator of medical and anatomical text-books, Miss Mary Dixon, of the Illinois University Medical School.

Though a few parents (fortunately an increasing number) give their children some instruction in sex matters, most boys and girls entering high school know little about the subject, except the vulgar phrases and inaccurate accounts current among those who have been exposed to debasing influences. In these aspects of the matter some children have become quite sophisticated. We aim in *Health as a Heritage* to restore the subject to its proper, honorable place. It is pure to those who come to it with clean minds; it is intensely interesting in its scientific as well as in its social aspects; it is inextricably interwoven with the most intimate strands of life. We must understand it, if we are to live intelli-

gently and successfully in our complicated and difficult environment.

In this little book we give the pupils a set of terms which will enable them to express their thoughts on sex matters without the use of the vulgar words which they properly shun in talking with parent or teacher. We approach the subject from the standpoint of plants and lower animals, in which the structures and processes are less complicated and therefore more easily understood than in human beings. Then we pass with comparative ease and freedom of expression to the discussion of human reproduction.

Our individual happiness and success in life depend largely on our avoiding the sex pitfalls which waylay our path. Not only disease of body but also pollution of mind, which debar men and women from their highest attainments in life, result from the unwise use of the sex function. Therefore, the second and third chapters discuss the dangers of wrong sex conduct, and aim to bring the pupils to adopt for themselves the course which leads, in sex matters, to a sound body and a wholesome mind.

How much the pupil profits by these lessons depends on himself. These pages lead to an understanding of the matter, but the pupil must learn to apply the teaching in his own life. He must adopt for himself the standard of sex conduct which will prepare him for the most wholesome conjugal life and bring him such children as will be a joy and blessing to his later years; and having adopted such a standard he must adhere to it, through trial and temptation, to the end of his days.

R. E. B.

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HEALTH AS A HERITAGE

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CHAPTER I

THE ORIGIN OF PLANT AND ANIMAL CHILDREN

Little children are still the symbol of eternal marriage between love and duty. — George Eliot.

I. Plants and Lower Animals

Life from Life. — In this lesson we shall aim to answer the question: How do new beings come into existence? People once thought that in fermenting or decaying substances certain minute living forms came into existence spontaneously; that is, that living things were produced just by the process of decay. But the microscope has revealed to us the details of the life of the tiny beings that exist in decaying things, and we now know, thanks to Louis Pasteur, that these lowly forms, as well as the plants and animals of more complex structure, come from preceding living beings of the same kind. Life comes only from life.

1. What was the doctrine of spontaneous generation?
2. Who disproved this old error?
3. What is the antecedent of every living thing?

Cells. — The living substance of every plant or animal resembles the raw white of egg. It is called *protoplasm*. It exists in tiny specks or in sacks. Each speck is a *cell*, and each cell has a central spot, called a *nucleus* (plural, *nuclei*). The cells, together with the substance which lies between them, compose the *tissues* which make up the bodies of all

plants and animals. The word "animal" includes all species, from the microscopic forms which live in the water to the highest and most complex, man. The number of such cells in one person is almost beyond imagination. In one joint of the finger there are perhaps 100,000,000, possibly twice that number. Yet all the cells of various kinds and unimaginable number, composing the body of any plant or animal, came into existence by a process of growth from the protoplasm of a single cell. The methods of that process are the first things we shall study.

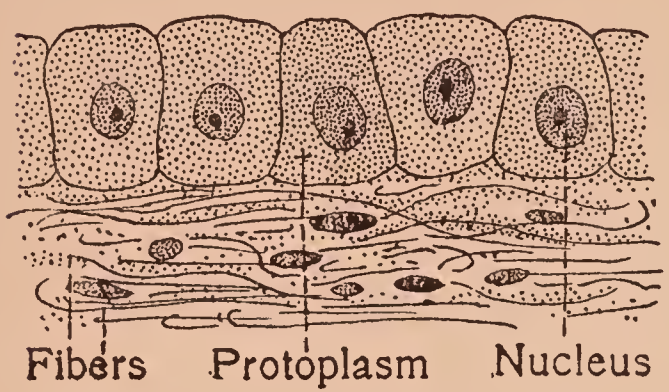

FIGURE 1. — A DIAGRAM OF TISSUE.

Within each large cell of the tissue is a nucleus, and within the nucleus a nucleolus (little nucleus). The cells rest upon a network of fibers, between which are the small cells which produce and care for them.

1. Of what is a cell composed?
2. What is tissue?
3. What is the origin of the millions of cells which compose a body?

Cell Division. — In the tiny plants and animals composed of single cells, and also in many living forms composed of a multitude of cells, there is a very simple method of reproduction called *asexual* (*a* means *not*). In the scum which forms at the surface of a dish of water in which something is decaying, great numbers of one-celled animals may be seen with a microscope.

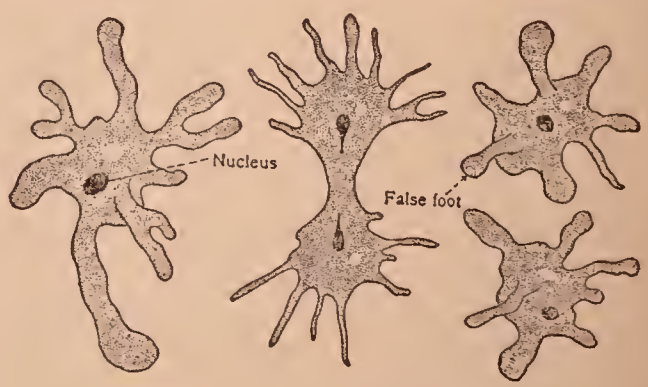

FIGURE 2. — AN AMOEBA.

The three stages represent the process of division in a one-celled animal.

Some one of these tiny beings may have a notch or groove around its middle, as though an invisible belt were drawn too tight. Watch it for half an hour or less, — the groove gets deeper, till the two parts of the cell are held together only by a thread of protoplasm. When this breaks, the two parts swim away as independent beings.

Describe the reproduction of a one-celled animal.

FIGURE 4. — A FRUITING MOSS DISCHARGING SPORES.

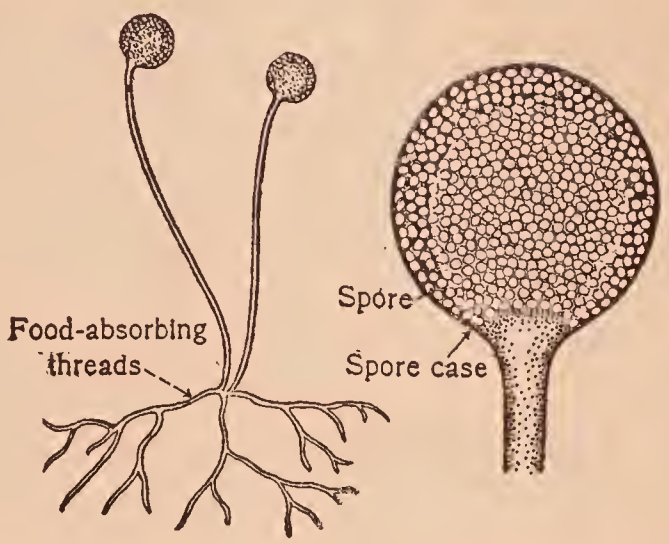

FIGURE 3. — A DIAGRAM OF BLACK MOLD.

The more highly magnified spore case is just ready to break open and scatter the spores.

Spores. — In some plant forms, for example green mold and black mold, the parent cell breaks up into many specks of protoplasm, called *spores*, the dust of the mold. When a spore falls upon some food material which is moist and of a suitable temperature, it takes in food and grows into a form like the parent. Ferns and mosses, and, in fact, nearly all plants of the lower kinds, reproduce by means of spores. It is a method by which a plant produces many offspring in a short time.

1. How are spores formed?
2. What advantage is there in this method?

Buds and Shoots. — The yeast we put into bread dough is composed of small cells. A projection called a *bud* forms at the side of the cell. It grows until it becomes nearly as large as the parent, when it breaks off and becomes a new individual. Reproduction by budding is very common also among animals of the lower groups (coral, moss-like animals, and others), but in these cases the bud at the side of the animal is composed of many cells. A great many plants send out shoots or branches, under ground or above, which at certain places form roots and stems, thus making new individuals. Gardeners cut slips from plants and put them in the moist soil, where they develop roots and become separate plants.

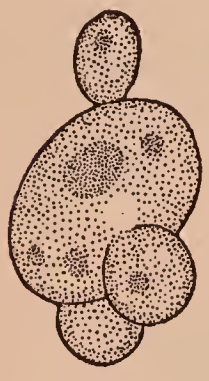

FIGURE 5. — A YEAST CELL WITH THREE BUDS.

1. Name several plants and animals which reproduce by means of buds.

2. What plants have you seen propagated by slips, cuttings, runners, or other asexual methods?

In asexual reproduction the offspring is just like the parent, is simply a part of the parent's body which has been separated from it and acquired an individuality of its own. This method of reproduction is found in nearly all plants and is common in the lower groups of animals.

Sexual Reproduction. — Sexual reproduction is a complex process, in contrast to the simple asexual method, and the new feature, which makes it so different from the asexual process, has deep meaning and far-reaching influence.

Spirogyra. — The reproduction in spirogyra may be taken to illustrate the simplest form of sexual reproduction. This little plant, found in fresh-water ponds, consists of a thread composed of cells placed end to end. At times two threads lying near each other send out projections which join and form a channel through which the protoplasm of one cell

travels to the other cell and unites with the protoplasm there. The essential thing in sexual reproduction is the union of the *nuclei* from two cells. In the case of the spirogyra they are common growing cells. The combined nuclei form one cell which after resting a while develops and so becomes a new individual.

1. What is the essential process in sexual reproduction?
2. How does the protoplasm get from one spirogyra cell to the other?

FIGURE 6. — TWO THREADS OF SPIROGYRA REPRODUCING.

The protoplasm of the growing cell is arranged in a spiral band.

Hydra. — This small animal, about the diameter of a pin and one fourth of an inch long, found clinging to water weeds, well illustrates sexual reproduction among the lower animals. The reproducing cells are not common growing cells as in spirogyra, but special cells set apart for reproduction. The larger of these two cells is called the egg cell or *ovum* (plural, *ova*); the smaller is called the sperm cell or *spermatozo'ön* (plural, *spermatozo'a*). The spermatozoa are produced in enormous numbers in a part of the hydra called the *spermary*. When they become mature, they break out and swim about in the water. Some of them by chance come near the ovum and are attracted to it. One of them succeeds in penetrating the ovum and uniting with its nucleus. This process is called *fertilizing* the ovum, for without it the egg would not grow.

1. How do the reproducing cells of the hydra differ from those of the spirogyra?
2. What is an ovum?
3. What is a spermatozoön?
4. What is fertilization?
5. Why need the spermatozoön have the power of movement?

Sex. — Sexual reproduction is found in all the great divisions of the plant and animal world, and is the only kind of reproduction possessed by the higher animals. In many of

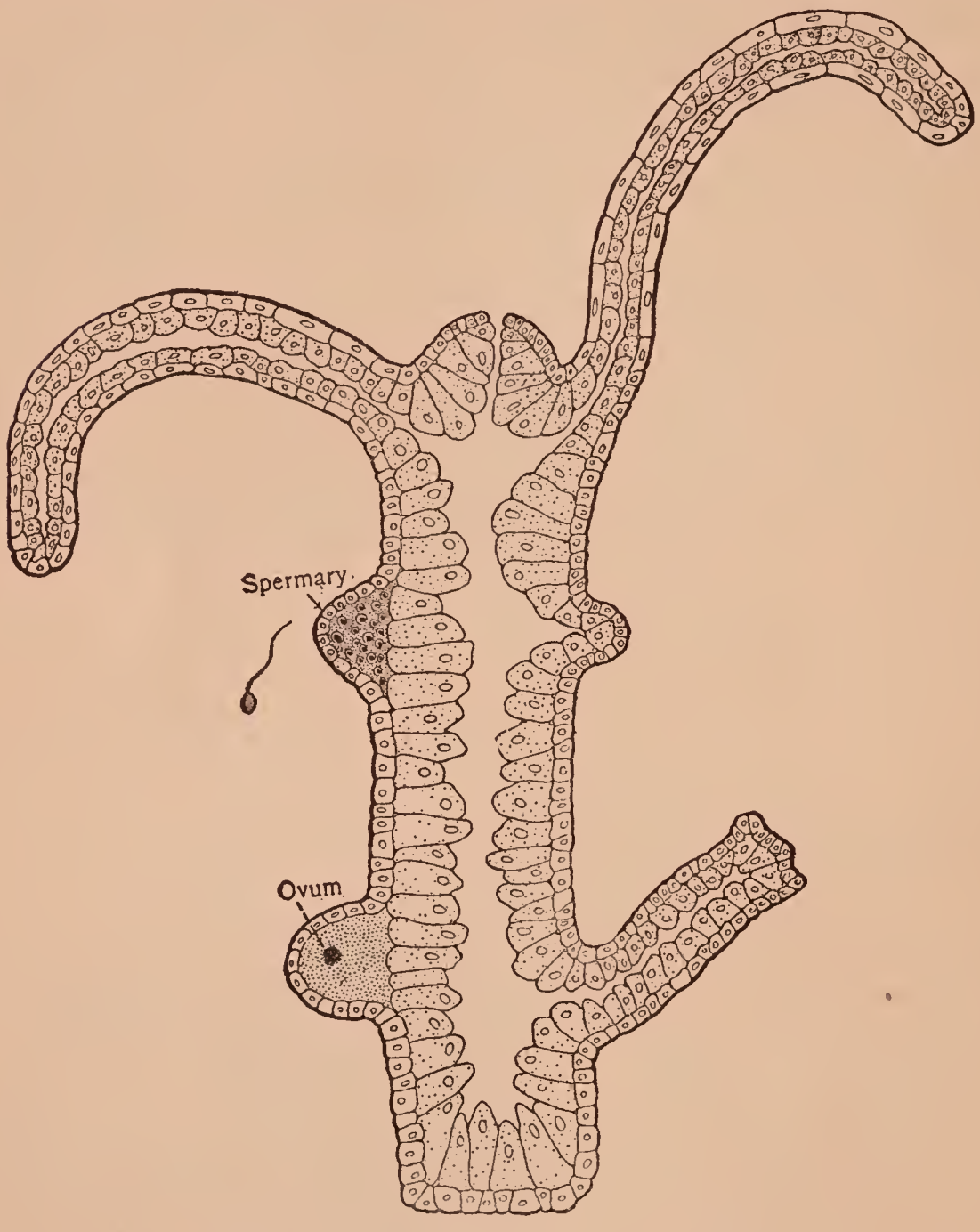

FIGURE 7. — A DIAGRAM OF A HYDRA.

The asexual reproduction is shown by the two buds on the right side, which will separate from the parent and become independent individuals when they have reached their full development. Sexual reproduction is accomplished by the organs at the left side of the figure. The single spermatozoön is more highly magnified than the spermatozoa within the spermary.

the lower forms of life both ova and spermatozoa are produced in the same organism. Such animals are called *hermaph'rodites* (Hermes, Aphrodite, the Greek names of Mercury and Venus). Common examples are sea anemones, some corals, most worms, and some snails. Though many flowers contain only one of the reproductive cells in one individual plant and the other cell in another individual, most common plants contain both cells in the same flower and are said to be *perfect*, which means the same as hermaphroditic. In most common animals the ova are produced in special organs called *ovaries*, found in the female only, and the spermatozoa are produced in organs called *spermaries* or *testes* (tes'-tēs), in the male only. This separation of ovaries and testes in different individuals gives rise to sex, male and female. There is no such sex difference in hydra, sea anemones, earthworms, and such animals.

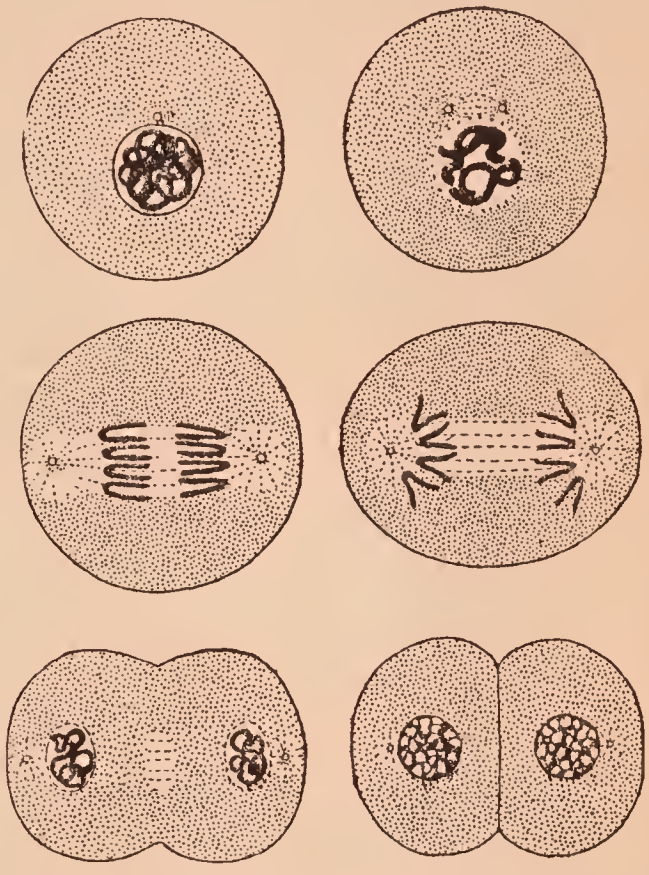

FIGURE 8. — COMMON CELL DIVISION IN GROWTH.

In the second stage the star-like central body has divided in two and the color bodies are becoming distinct. In the third stage the central bodies have taken their position in opposite poles of the cell and the color bodies have divided, keeping the original number. In the fourth stage the color bodies are gathering at the poles. In the fifth stage a constriction is beginning to divide the cell. In the sixth stage the division is complete.

1. What is the fundamental difference between a male and a female?

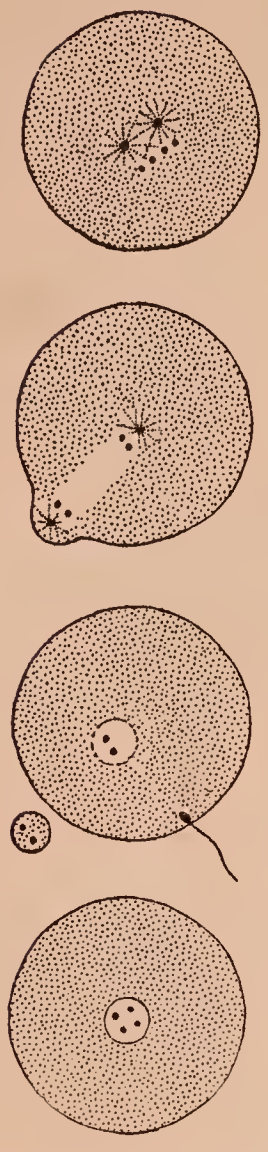

FIGURE 9. — THE MATURATION DIVISION OF THE EGG CELL.

In the first stage the star-like central body has divided. In the second stage the nucleus has divided and one half the color bodies are being expelled. In the third a spermatozoön is entering the egg cell to fertilize it. In the fourth stage the nucleus is shown with the full number of color bodies, two of which are from the spermatozoön.

2. What are bisexual animals called?
3. What is a perfect flower?
4. What is an ovary?
5. What is a testis?

Chromosomes. — To understand something of the deep significance of sexual reproduction, it will be necessary to study something of the structure of the nucleus. As a cell prepares to divide in growth, the tiny granules which are in the nucleus arrange themselves in lines, called *color bodies* (*chrómosomes*) since, when stained, they take a deeper color than the remainder of the cell. Every plant and every animal has a certain distinctive number of color bodies in each nucleus. Some organisms, as certain worms, have a small number, four, while others have more than a hundred and fifty. The human cell has twenty-four, according to some authorities. When the cell divides in growth, every color body divides in two, thus maintaining in each nucleus the distinctive number of chromosomes.

1. What are chromosomes?
2. How many chromosomes are in a nucleus?
3. What change do the chromosomes undergo when the cell divides? Figure 8.

Inheritance. — We shall next consider the part these color bodies play in reproduction. As the egg cell prepares (a process called *maturation*) for union with the sperm cell, it divides in such

a way that half the chromosomes are in one group and the other half in another group. One of these groups is expelled from the cell and plays no further part in the inheritance game. The other group remains in the cell as a half nucleus. In some unexplained way, the qualities which offspring inherit from parents are conveyed through the chromosomes. Certain qualities are tied up with one color body and other qualities with other color bodies. Since the mother's inheritable qualities go with the chromosomes, one half of them are discarded with the expelled group of color bodies and the other half are transmitted to the offspring through the retained color bodies. Which chromosomes are discarded in any case and which are retained seems to be a matter of chance and can not be foretold.

FIGURE 10. — A SPERM CELL DIVIDING INTO TWO SPERMATOZOA.

Each spermatozoön carries one half the number of color bodies of the original sperm cell.

The sperm cell, when preparing to fertilize the egg cell, also divides into two spermatozoa in such a way that each contains only half the number of chromosomes. One of these spermatozoa unites with the half nucleus of the egg cell, thus joining half the transmissible qualities of the father with half those of the mother and producing a nucleus with the full number of chromosomes. As the fertilized egg cell grows, it divides in such a way as to split each color body, thus retaining the full number of chromosomes in each cell of the young which develops from the egg.

1. How does the maturation division of the nucleus differ from the growth division? Compare Figure 8 with Figure 9.

2. What becomes of each half of the nucleus? Figure 9.

3. Why does the offspring inherit only half of the mother's transmissible qualities?

4. Why are only half of the father's transmissible qualities conveyed to the young?

5. How does it come that every cell of the young contains the same kind of chromosomes?

Sibs. — This is a convenient term used to designate all the offspring, brothers and sisters, common to two parents. Since each sib owes its characteristics to the color bodies which happen to be retained in the maturation discard, the sibs will be much alike if in their several cases many of the same chromosomes are retained, and they will be very different if they carry few of the same chromosomes. Since with even a few chromosomes thousands of combinations are possible, it is quite unlikely that any two sibs (except identical twins) will have exactly the same inherited qualities. A girl may inherit from her father a large frame and strong muscles, while the brother inherits from the mother a small stature and delicate features — no one can foretell just what the combination of characteristics will be.

1. Why are sibs often alike?
2. Why are sibs often very different?
3. Why are we unable to foretell which parental characteristics will appear in the offspring?

Sex Determination. — Animal breeders have always wished they could produce male or female animals in their herds at will, and parents often wish they could fix as they like the sex of the child to be born, but no method has been discovered by which the sex of the offspring can be controlled. We now know that the sex is determined at the time of the fertilization of the egg cell. One of the chromosomes of the sperm cell has the power to make the offspring to which it is transmitted a female. When the sperm cell divides into two spermatozoa, the chromosome with female potentialities goes into one of the spermatozoa. If this spermatozoön fertilizes the egg cell, the offspring is a female. If the other

spermatozoön, which lacks the sex-determining chromosome, fertilizes the egg, the offspring is a male. We do not know of any way in which we can influence one of the two spermatozoa in preference to the other to fertilize the egg. Therefore we cannot control the sex. By the law of chance the males and females are about equal in number.

1. What determines the sex of the offspring?
2. Why have we not been able to control the sex of offspring?

Twins. — Most animals have a characteristic number of young produced at one time. How many are produced depends chiefly on the number of eggs which mature at one time. Some fish have millions; cats and dogs usually have three or four to eight or ten; sheep commonly have two; horses and human beings one. Human twins are commonly caused by two eggs maturing at the same time. Such twins may be the same sex or brother and sister and are no more alike than are other sibs. But sometimes a fertilized egg, early in its growth, divides into two parts which separate, each forming a separate individual. Twins so formed are called identical or one-egg twins. Since they have the same chromosomes they are in all instances the same sex and are so alike that even their parents can hardly distinguish one from the other.

Why are some twins so alike as to be hardly distinguishable from each other while other twins have only a sib resemblance?

How Reproducing Cells Get Together. — *In Flowers.* The *pollen grain* (commonly a yellow dust in flowers) is a minute body which contains the sperm cell. The egg cell is within the *pistil*, the part which becomes the pod when the eggs develop into seeds. From the pollen which has been brought to the tip of the pistil, a long tube grows down through the pistil until it reaches the *ovule* (little egg), where the half nucleus of the sperm cell joins that of the egg cell.

The fertilized egg cell remains in the pistil, receiving nourishment from the plant's food and growing into a seed, which is a young plant with stored-up food, ready under favorable conditions to sprout and grow.

The blossom and honey of the flower serves to attract insects, which by chance rub against the pollen of one flower and frequently carry it adhering to their rough bodies to another flower of the same kind. There it may rub off on the sticky end of the pistil and fertilize the egg cell. The pollen of some flowers fertilizes the egg of the same individual, a process called *close fertilization;* but in most plants there are devices by which this is prevented and the carrying of pollen from one flower to another of the same kind is insured, a process called *cross fertilization.* Cross fertilization is thought to give stronger plants, and so is the method most favored in nature.

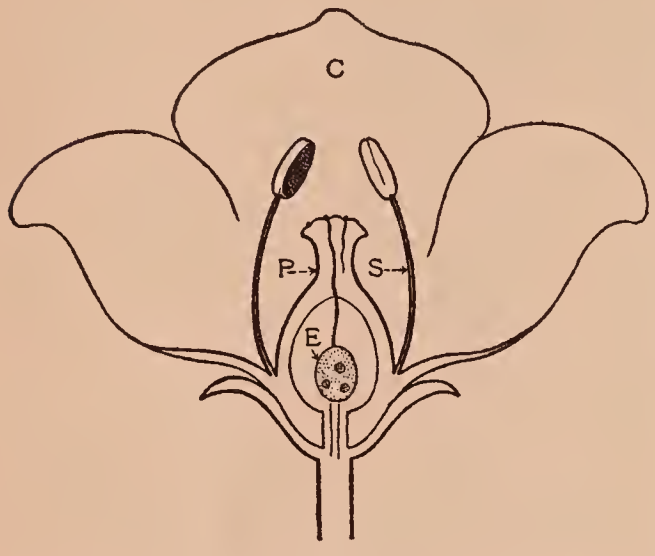

FIGURE 11.—A DIAGRAM OF A FLOWER.

C, the corolla, the colored leaves of the flower; *S*, a stamen, from whose sacks pollen is brought to the pistil; *P*, the pistil, on whose surface are three pollen grains, from two of which tubes are growing; *E*, the egg cell, reached by one pollen tube.

In all the higher animals and in many plants and lower animals cross fertilization is made necessary by the fact that the sperm cells and the egg cells grow in separate individuals, the male producing the sperm cell and the female the egg cell. We have seen that in flowers a common method of bringing these two cells together for fertilization is by enticing insects to carry the pollen. In most animals the opposite sexes have an instinct to seek one another.

1. What is pollen?
2. Where is the ovum in flowers?
3. How does the sperm cell reach the ovum?
4. How is pollen brought to the pistil?
5. What is the difference between close fertilization and cross fertilization?

In Water Animals. The process by which the reproducing cells are brought together differs a great deal in different animals. Some water animals, as barnacles and corals, live in colonies fastened to rock or shell foundations. Others, as clams and starfish, move about independently but exist in large numbers in the same locality. The males of such animals simply discharge their spermatozoa into the water in the season when the eggs are ripe, and rely on some of them finding their way to the egg cells.

Some fish smooth off a place in the sand or find under a stump a nook in which the female lays her eggs; then the male takes charge of the nest and deposits the *milt*, which consists of millions of spermatozoa. Most of the eggs are soon fertilized by the spermatozoa which swarm about. Frogs fertilize their eggs in a way very similar to that of the fish, but the male frog clings to the female and deposits the spermatozoa on the eggs just as they are being laid in the water, thus making their fertilization more nearly certain.

1. What is the common method by which spermatozoa find the egg cells of small water animals?
2. What do fish and frogs do to make the meeting of the reproducing cells more nearly certain?

In Land Animals. Obviously the land animals cannot discharge their spermatozoa aimlessly with any probability of their reaching their goal, the egg cells. They must employ another method. In all the higher animals and in many of the lower, such as insects, the male introduces the spermatozoa into a sack in the female's body prepared to receive them. This is done in the act of mating.

The story of the bee is an interesting illustration of mating. The hatching of a queen bee is a great event in a hive. The young queen runs fussily about the hive for a time and then launches out on what is called the *marriage flight.* As she rises in the air the *drones,* the males, who are waiting for her outside the hive and on the bushes about, pursue her. She swiftly flies higher and higher, the suitors straggling after. Finally one of her pursuers overtakes her and mates with her in the air. After the queen has received the spermatozoa from the male, she tears herself away from him and returns to the hive. Thereafter she lives within the seclusion of the hive, at intervals laying batches of thousands of eggs, which are fertilized as they are laid, by the spermatozoa that she received from the drone in her marriage flight and which are kept stored in a little sack in her abdomen, stored sometimes for two or three years.

Birds mate frequently, perhaps for each egg that is laid. In the hen there is a long coiled tube (*oviduct*) leading from the ovary to the outside. The yolk of the egg, with the germ cell at its surface, is produced in the ovary. As it passes down the oviduct the white of the egg and the shell are added. Since the sperms cannot penetrate through the shell and white to reach the germ cell, the egg must be fertilized at the upper end of the tube. In mating the rooster deposits the spermatozoa in the external opening of the oviduct, and the active little sperms swim along the moist lining of the tube to meet the egg as it leaves the ovary.

1. How do land animals bring the sperms to the egg cells?
2. Describe the marriage flight of the bee.
3. How is the queen bee able to lay fertile eggs two years after her single mating with a drone?
4. How do the fowl's spermatozoa reach the egg cell?
5. Why does the rooster mate with the hen just *after* she has laid an egg?

Growth within the Egg. — *Food Provisions.* The fertilized egg cell must grow to produce the young animal, and must, therefore, be supplied with food. What we call an egg is commonly the egg cell surrounded by its food material, and all is inclosed in a shell. Occasionally it is the egg cell alone. If the young animal has, when it is little grown, the power of getting its own food, the egg is comparatively small, and the young is hatched small and poorly developed. The butterfly, an example of this kind, lays her eggs on the leaf of some plant, so that the young are in contact with their food when they hatch, and have only to open their mouths and eat. Most insects follow a similar practice of laying their eggs on a food substance. Frogs' eggs hatch in the water, and the tadpoles swim to a soft water plant to which they cling and on which they feed.

If, on the other hand, the young animal must be well developed before it is prepared to come out of the security of the shell, the egg is large, containing a sufficient quantity of food material for the growth of the young. Birds and reptiles are animals of this kind. They lay few eggs compared with the hundreds of thousands of small eggs which a fish lays, and they usually take better care of their eggs and of the young. Birds keep their eggs warm by sitting on them, and reptiles bury theirs in a warm place.

1. What do many eggs contain besides the germ cell?
2. How does the butterfly prepare for feeding her young?
3. What means of sustenance have newly hatched tadpoles?
4. Why need birds' eggs be so much larger than fishes' eggs?
5. Discuss the significance of the fact that a robin lays three or four eggs while a quail lays fifteen or more.

Embryo Respiration. The young animal, *embryo*, growing within the egg needs oxygen as well as food, but the oxygen cannot be stored within the egg; it must be brought in from the air continuously as it is needed. If the embryo is very

small, the oxygen of the atmosphere or in the water can penetrate to all parts of it and supply its needs; but in the larger embryo there must be a special organ for breathing, and a circulating blood to distribute the oxygen and food to all parts of the body. While the bird embryo is still very small, it

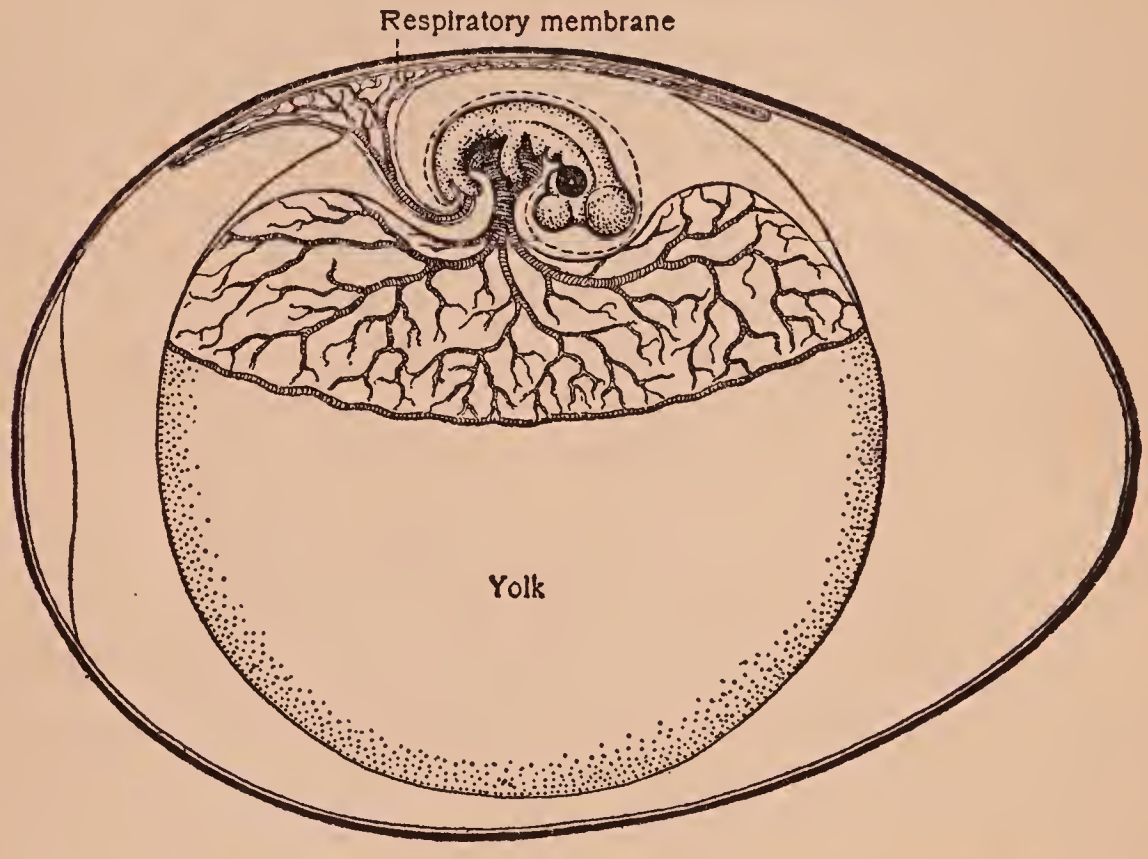

FIGURE 12. — A DIAGRAM OF A BIRD'S EGG CONTAINING AN EMBRYO.

One set of blood vessels spreads over the yolk to absorb food and bring it into the embryo. Another set spreads out against the shell to take in oxygen and give out carbon dioxid.

develops a thin membrane filled with blood vessels, which soon spreads over the inner surface of the shell. Through the porous shell the gases pass, oxygen coming into the embryo's blood and carbon dioxid, the waste gas, going out. In this way the membrane acts as a gill or lung.

1. How do very small embryos get oxygen?
2. By what special apparatus do larger embryos take in oxygen?
3. How is the oxygen distributed through the embryo's body?

II. Mammals

We are now prepared to study reproduction in the highest group of animals, the mammals, those which nourish their young with milk. We have seen that sexual reproduction is superior to asexual in bringing variety and vigor to the cell. We have noted the value of cross fertilization, the many devices for securing it, and the impossibility of close fertilization when the egg cell and the sperm cell are produced in individuals of different sex. We have discussed the methods of fertilizing the ovum and the provision nature makes for maintaining the life of the embryo. It now remains to see

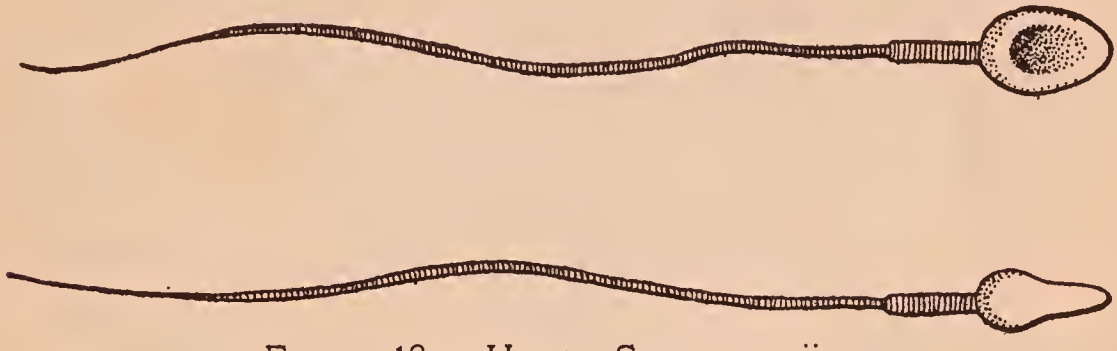

FIGURE 13. — HUMAN SPERMATOZOÖN.
Seen from two aspects, magnified about 2000 times.

how these principles are applied in detail in the highest animals.

The Male Function. — The work of the male is to produce and bring to the female the spermatozoa, and to aid in protecting and feeding her and the offspring. The spermatozoa are produced in a pair of organs called *testes* (tes′tēs). The testes consist mainly of many coiled tubes whose lining cells undergo division. The separated half of the divided cell splits into spermatozoa each of which contains half the full number of chromosomes. The spermatozoa from all the tubes of each testis are gathered into the main tube or duct which passes from the testis over the pubic bone and behind the bladder, opening just below the bladder into the *urethra*, the tube through which urine is discharged.

Though the spermatozoa leave the testes by the hundreds of thousands, they are so tiny that they and the fluid which floats them make a very small quantity. To make a mass large enough to be forcibly discharged, fluid is added by se-

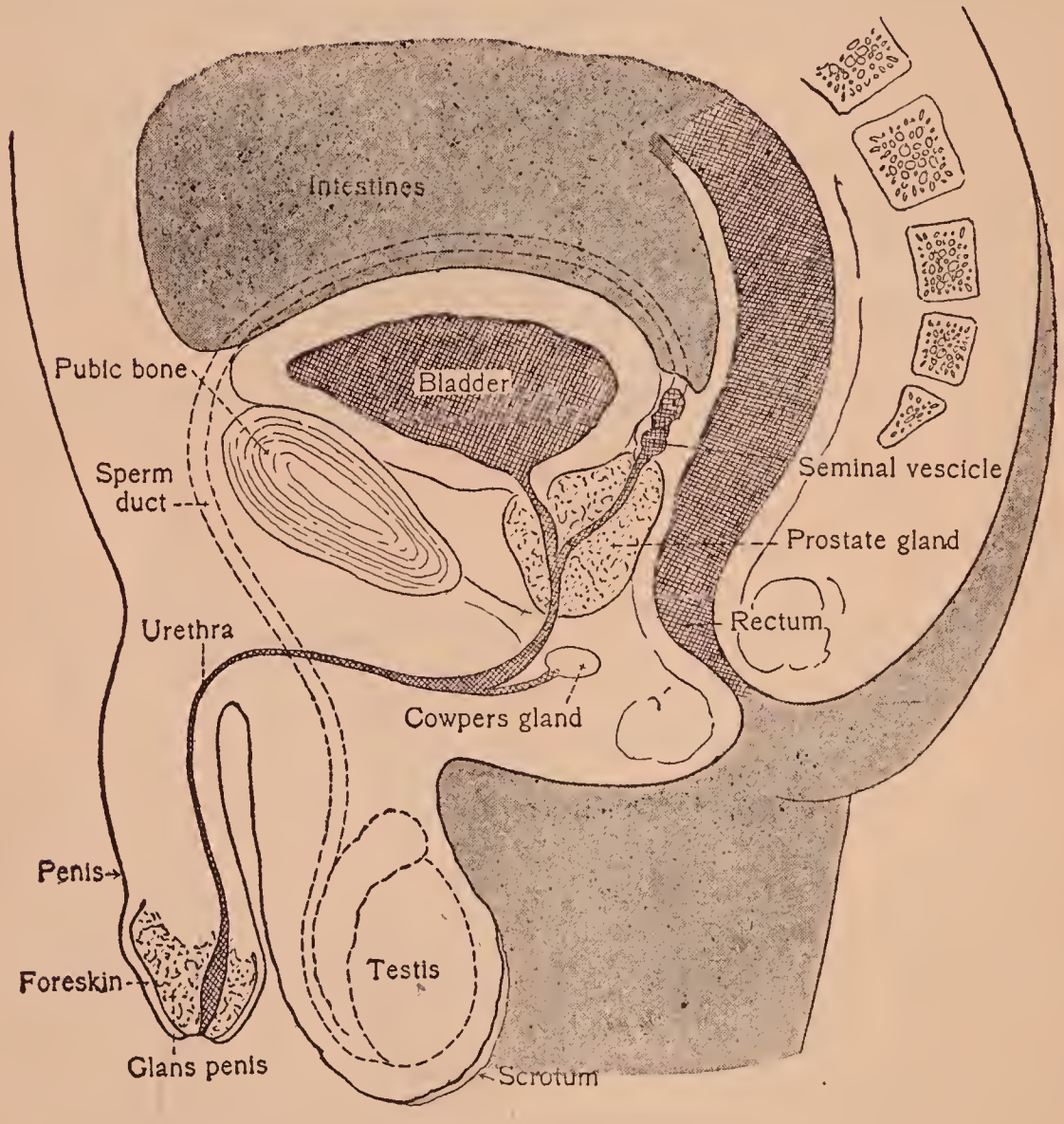

FIGURE 14. — SECTION THROUGH THE MALE PELVIS.

creting glands along the route, by the *seminal vescicles* lying behind the bladder, by the *prostate* gland around the urethra at the outlet of the bladder, and by *Cowper's* glands, a small pair opening into the urethra a little lower than the prostate. These fluids together with the spermatozoa compose the *semen*. The spermatozoa are the vital part of the semen.

The accompanying fluids, besides increasing the quantity of the liquid, provide a protective surrounding in which the spermatozoa can live for some time, perhaps several days. Around the sperm duct and the urethra are fibers of involuntary muscle whose contraction drives out the semen.

1. What is the function of the male?
2. Where and how are the spermatozoa produced?
3. Describe the course of the sperm duct.
4. From what organs are fluids added to the spermatozoa?
5. What is semen?
6. How is semen driven out of the urethra?

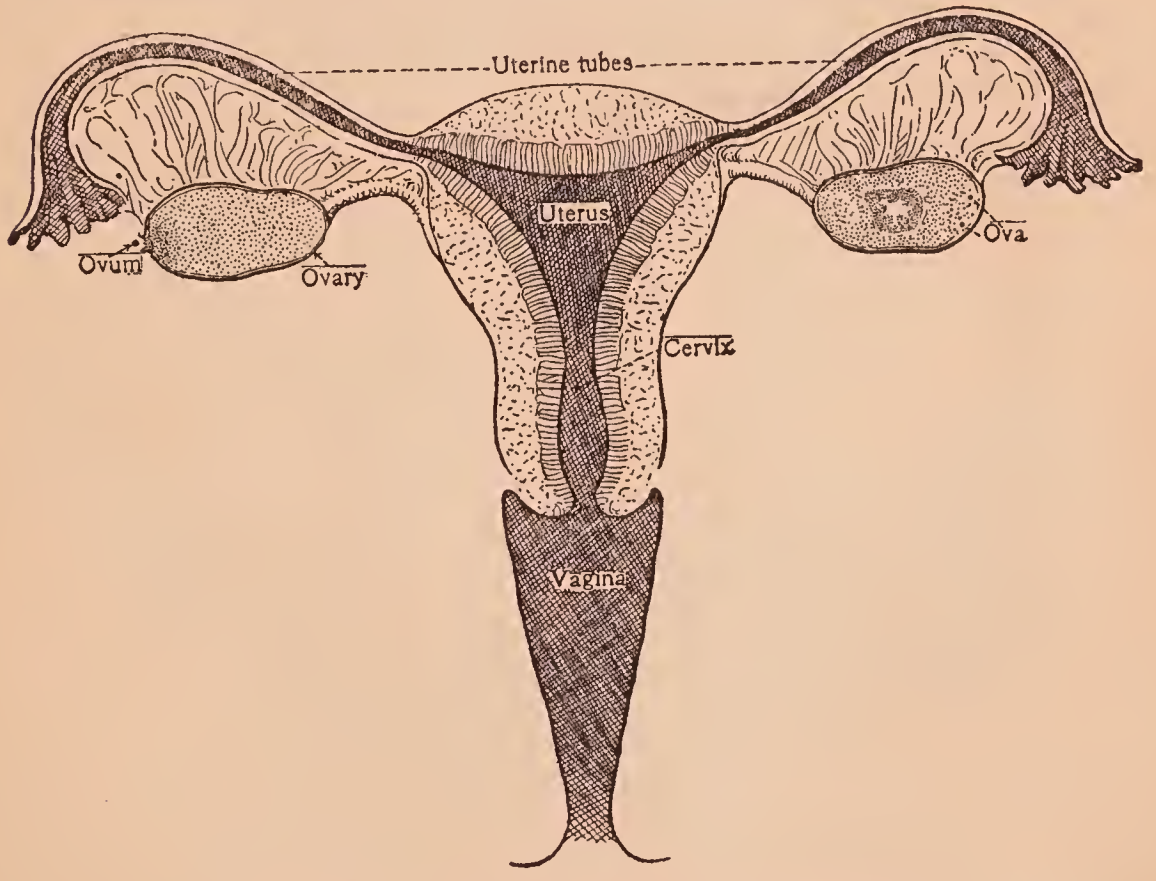

FIGURE 15. — FEMALE REPRODUCTIVE ORGANS.

Front view.

The Female Function. — The female produces the egg, and for the embryo growing from the egg she provides the conditions necessary for its life, and after its birth she nourishes the young until it is able to take ordinary food. The eggs are produced in the *ovaries*, a pair of small organs

situated in the abdominal or in the pelvic cavity. In human beings the eggs mature (become ripe) about once a month, usually one at each period.

On maturity the egg breaks through the membrane covering the ovary and is received into the open end of the *uterine*

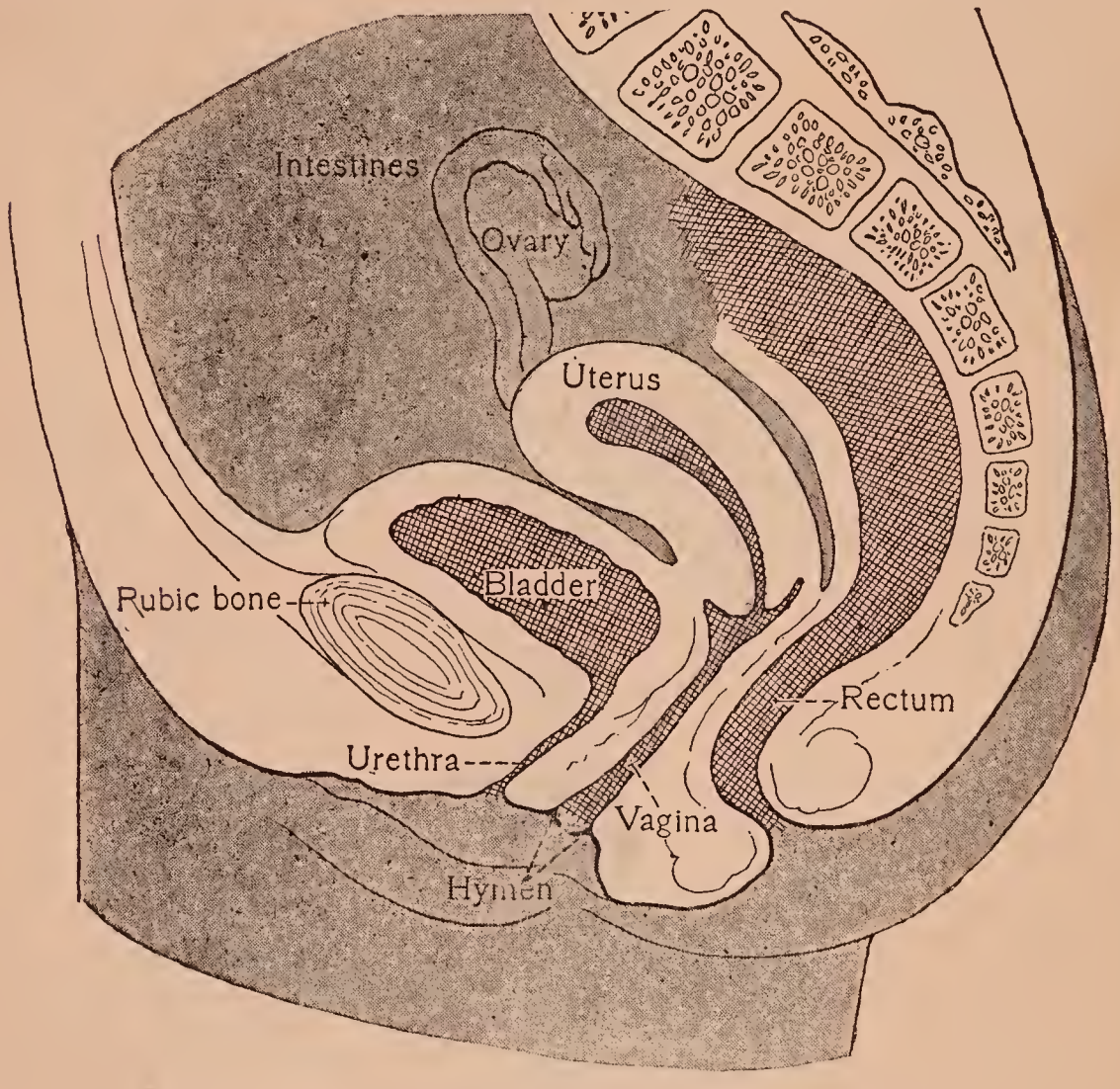

FIGURE 16. — SECTION THROUGH THE FEMALE PELVIS.

(Fallopian) *tube*. The uterine tubes, one on each side of the pelvis, are lined with *cilia* (small threads of protoplasm projecting from the cells), which by their wavelike motion sweep the eggs to the *uterus* (womb), a sack with muscular walls lying in the middle of the pelvis. A small opening leads through the neck (*cervix*) of the uterus to the *vagina*. The semen from the male is received at sexual intercourse in

the vagina. The thousands of spermatozoa, moving blindly about, swarm over the moist lining of the vagina and uterus. Many of them work up the uterine tubes, ready to meet the egg when it leaves the ovary. They may live in the uterus and tubes for a week or two.

If the egg is fertilized, it lodges in the uterus and grows. This process is called *conception*. Since only one of the thousands of spermatozoa is needed to fertilize the egg, conception will probably occur if any sperm cells are present. If the egg is not fertilized, it remains only a short time in the uterus and is then discharged.

1. What is the function of the female?
2. Where are the ovaries?
3. How frequently does ovulation (the discharge of a mature egg) occur in human beings?
4. How are the eggs conveyed to the uterus?
5. What is the uterus?
6. How do the spermatozoa get to the eggs?
7. What is meant by conception?
8. Why will conception probably occur from sexual intercourse at any time of the month?

Embryo Life. — We learned on page 15 that the large eggs of reptiles and birds are stored with food to supply the growing embryo until it is well developed and ready to come out into the world, and also that the oxygen needed by the embryo is obtained by means of a respiratory membrane under the shell. We shall now see how the mammals better provide for their developing young. Mammals produce eggs so small as hardly to be visible, about one hundredth of an inch in diameter. The fertilized egg, as also the embryo which develops from it, is retained within the uterus, protected, warmed, nourished, supplied with oxygen, and its wastes removed until it is grown and ready for birth. The embryo or *foetus* (fē′tus) receives its supplies through the mother's blood in the following manner:

When the fertilized egg lodges in the uterus, it sends out little projections (*villi*) which fasten in the lining of the uterus and absorb from it their nourishment. In a few days the embryo grows so much that it needs a blood system to distribute the supplies to all parts of its body. The villi on one side of it together with the lining of the uterus at the place of attachment develop into the *placenta* (called *after-birth* because it is expelled a little while after the birth of the child), an organ filled with blood vessels. There is a cord reaching from this placenta to the *umbilicus* (navel) of the foetus. Through this cord run two arteries from the foetus to the placenta, and a vein returning. In the placenta the small blood vessels of the foetus entwine with those of the mother. The blood of one does not mingle with that of the other. There is always a thin membrane between them. Through this membrane the food and oxygen pass to the embryo's blood and the wastes, carbon dioxid and nitrogenous substances, pass into the mother's blood for elimination.

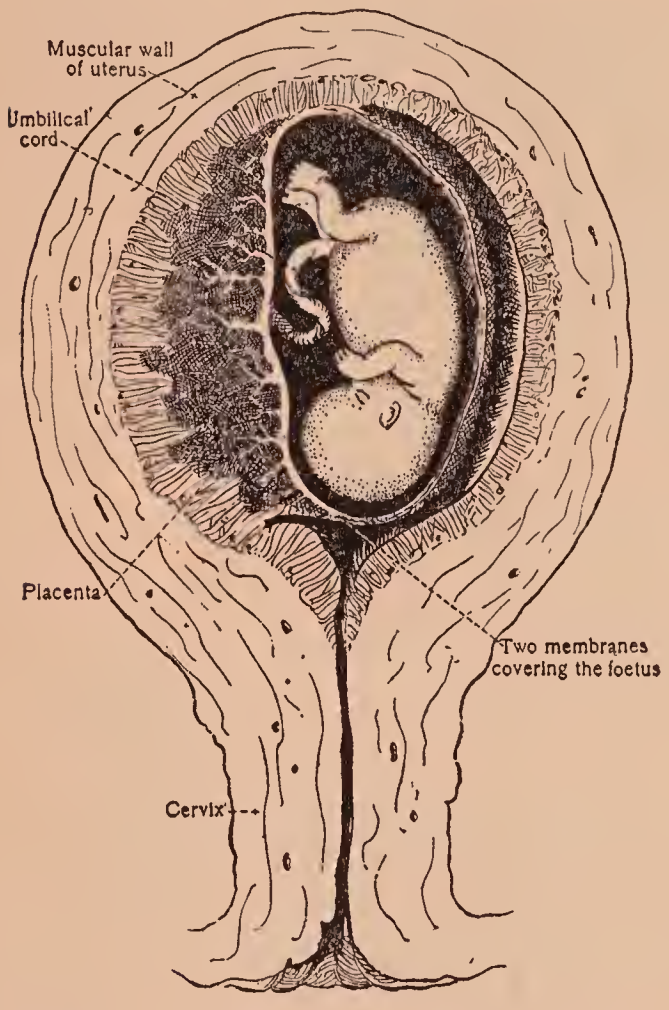

FIGURE 17.—SECTION THROUGH A UTERUS.

The foetus is about two months old and is about one half the natural size.

The human foetus is carried in the uterus nine months, the *gestation* period. This period is as short as a few weeks for some of the small mammals and nearly two years for the ele-

phant. As the embryo enlarges, the uterus grows to accommodate it, and the muscles in the walls of the sack increase in preparation for the work they have to do at the birth of the child. For it is by the contraction of the uterine muscles that the young is finally expelled from its first warm nest into the cold world.

After the child is born and begins to get its oxygen by breathing, the cord is cut. The piece remaining attached to the child shrivels and drops off after a few days, leaving the navel, or umbilicus. While the foetus is developing, the mother's milk glands, *mammae*, are also growing, that the food may be ready when it is needed. A few hours or sometimes a day or two after the birth of the young, milk forms in the mammae and the instinct of sucking stimulates the young to seek its food. Henceforth the care of the young is not simply the working of the unseen bodily functions; it involves the conscious actions of nursing and protection, controlled by the faithful parental instincts.

1. How large are mammal eggs?
2. How do mammals give their eggs more secure protection and certain warmth than do the lower animals?
3. From what source does the foetus get its food and oxygen?
4. How does it get rid of carbon dioxid and nitrogenous waste?
5. What is the placenta?
6. What is the umbilical cord?
7. What is the use of the muscles in the walls of the uterus?
8. How are mammalian young nourished?

CHAPTER II

SAFEGUARDING THE SEX LIFE

The gods visit the sins of the fathers upon the children. — Euripides.

Matters of sex are so fundamental in our relations with one another that the life of a boy or a girl, as well as that of a man or a woman, may be filled with blessing by keeping this function wholesome, or it may be blasted almost beyond healing by the abuse or wanton use of this sacred power.

Adolescence. — During childhood sex plays a relatively small part in life, but at puberty, the age at which the coarse hairs (pu'bēs) first appear in the armpits and groins, usually between the thirteenth and seventeenth year, a great change comes over the boy and the girl. The sex organs, which have been small and inactive, take on a sudden growth. The undeveloped cells of the ovary become periodically mature eggs and are cast off. The uterus enlarges. The testes begin to produce spermatozoa, and the other secreting glands to secrete their fluids. The whole body feels the new life. Brawn and bone are in evidence. Grace of form appears.

The mind, too, undergoes a revolution. The boy and the girl are no longer the simple comrades in work and companions in play that they were. She is invested with charms and attractions hitherto unperceived; and he is clothed with new might and virtue in her eyes. Proud of their new powers, boys and girls sometimes think that now they are grown up, ready for the new life as men and women. But the human stock matures slowly; there still lack six or eight years before the powers of sex are fully ripe. To anticipate

their full development, as is done in very early marriage, is a serious mistake.

1. Why is the beginning of adolescence called "puberty"?
2. What changes of sex organs occur at puberty?
3. What change of relationship between boys and girls occurs at this period?
4. Why are not boys and girls suited for marriage as soon as their sex organs begin to function?

Hormones. — The strength and beauty of the adolescent growth is caused by the development of the sex organs. As the ovaries in girls become larger at puberty, certain cells in them begin to secrete a *hormone* (hor′monē), a substance which is absorbed by the blood and carried to all parts of the body. The hormone stimulates the rapid growth characteristic of this age and molds the awkward girl into a beautiful womanly form. It also acts on the brain and causes the mind to develop its characteristic traits. Without this secretion by the ovaries the perfect woman does not develop.

In the boy there is a corresponding hormone secreted by certain cells of the testis, called *intersti′tial* cells because they lie in the interstices or spaces between the sperm-producing cells. When this hormone is absorbed and carried throughout the body, it causes the growth of the manly frame and inspires the courageous spirit. Without this secretion the body and mind do not acquire their full vigor. It is, therefore, of the utmost importance that these secreting reproductive organs be kept in perfect health.

The gland grafting that we sometimes read about in the papers consists in grafting a part of a testis from a young man, or sometimes from another animal such as a goat, into the body of an old man. The thought is that the interstitial cells of the grafted gland will produce their hormone in the old man, whose testes have ceased to function, and in this way give him renewed vigor. In some cases the operation seems

to be partially successful, at least for a short time. The grafted glands seem to be absorbed and disappear after a few months.

1. Where are the sex hormones produced?
2. What effect on girls has the hormone they produce?
3. What effect on boys has the hormone they produce?
4. Why are "glands" sometimes grafted into old men?

Castration. — Male animals raised for food or work are usually " cut " or *castrated* when they are small, that is, their testes are cut out. This renders them more docile and their flesh more tender. It prevents the development of all sex instincts and the fighting spirit and makes them take on fat more readily. The gelding (horse), the steer or ox, the wether (sheep), the barrow (pig), the capon (chicken) are such animals. The removal of the ovaries of the female is not so easy and is not so frequently done. Slave boys in oriental countries have sometimes been castrated, made *eunuchs*, that when grown they might be placed in charge of the women's quarters, since they would feel no sex attraction for their charges. The operation would be a crime in this country.

1. What is castration?
2. Why would a gelding be more suitable than a stallion to work in team with a mare?
3. Why are not steers commonly used in the fighting ring instead of bulls?
4. Why are epicures willing to pay a fancy price for capons?
5. What is a eunuch?

Circumcision. — Arabs, Jews, and some other peoples have for thousands of years had the practice of *circumcising* their boy babies. The operation consists in cutting off the foreskin of the penis. (See Figure 14.) Savages do this with a flint or other sharp stone; modern priests use a surgical knife and observe aseptic precautions. Some physicians advise

that all boys be circumcised, claiming that it renders them less subject to infection. Others advise against circumcision except in cases in which the foreskin is too tight or otherwise abnormal. There seems to be a difference of opinion as to whether the circumcised penis is more sensitive or less sensitive to sexual excitement than the uncircumcised.

1. What is circumcision?
2. Who practice it?
3. Give arguments for and against making the practice general.

Masturbation. — The external sex organs of little children sometimes have some slight defect, such as the skin's adhering where it should be free; or the urine or some other secretion produces an irritation and causes the child to rub or scratch the organs. The trouble can usually be remedied by a physician, and it should be promptly cared for, since otherwise the child might get accustomed to excite the sex organs and thus contract a most vicious habit. Whether such a habit, called *masturbation*, is thus established because of an irritation of the organs, or whether the boy or girl deliberately stimulates them for the sake of the sensation, it is an exceedingly harmful practice.

To stimulate the nerves of the sex organs idly or wantonly is to degrade to a vulgar use a passion which has an exalted function in conjugal life; it is a serious offense against oneself and against one's future mate; it takes away one's self-respect and makes one a coward before others. The young man or young woman who persists in this vice becomes in extreme cases a moral and physical wreck, with a pale, weak body and hysterical mind. Any one who has fallen into the vicious habit of self-abuse can escape this horrible outcome by a determined effort and a hard fight. Sometimes the coöperation of a physician is almost indispensable. Normal health and strength are usually quickly recovered after the evil practice is stopped.

1. How does the practice of handling their sex organs sometimes originate in children?
2. What can be done to prevent it?
3. What harmful effects, mental and physical, has persistent masturbation in older boys and girls?
4. How can the bad practice be overcome?

Vampires. — Young men are often victims of charlatans, so-called "doctors," and quack remedies. Advertisements appear in the newspapers describing symptoms of the sex diseases that are said to lead to serious debility, to loss of manhood, and to other evils. The claim is made that the trouble can easily be cured by the medicine or by the charlatan advertised. The young man who reads is convinced that he is in a dangerous condition; he feels timid about consulting the family physician, so he goes to the "specialist." These advertising "doctors" are usually scoundrels, who delude the youth into taking medicine he does not need. If anything is wrong with the sexual functions of a young man, he should consult the most trustworthy physician he can get, the one who attends the other members of his family.

1. Why should advertising "doctors" always be avoided?
2. Why is the family doctor the best physician to consult when one suspects his sex organs may not be just right?

Night Emissions. — Boys should know that voluptuous dreams accompanied by seminal emissions are normal, the experience of all young men, and not the grave symptoms of departing virility. The reproductive glands in health are always producing a small amount of fluid, part of which is absorbed again, part escapes with the urine, and part is lost in occasional night emissions. The amount that is lost is small and does no harm unless the boy has been indulging unclean thoughts or practices. The boy who excites his sex feelings by vulgar stories, by thinking about sex relations, or by handling his organs stimulates an undue quantity of secre-

tion which, pressing against the walls of the gland or duct, sets up a nerve excitation which gives rise to sex dreams and the resulting emission of semen. The boy who keeps his mind occupied with worthy things has nothing to fear.

1. Why should occasional night emissions give a boy no concern?
2. How can a boy avoid too frequent emissions?

Menstruation. — Young women experience after puberty the periodic discharge of blood from the uterus, the *menstruation*. It recurs at periods of about twenty-eight days and in health lasts from three to five days. The bleeding is caused by some of the lining cells of the uterus breaking down and exposing the very small blood vessels, which are easily ruptured. The muscular contractions of the uterus check the bleeding, and new cells soon replace those broken down. The purpose of this function probably is to prepare a fresh surface for the attachment of the egg. Although a mature egg may be discharged from the ovary at other times, this process (*ovulation*) usually occurs just before menstruation. Hence it is that conception usually occurs at this time.

If a girl is normal, she should not baby herself by going to bed or sitting in an easy chair for a day or two during her period; she should be able to continue her usual work, but *should avoid any unusual strain or fatigue*. Wet feet or chilling is to be guarded against. Exercise is desirable but should be somewhat moderated. Clothing should be loose and easy; and the pressure of all stays, bands or straps, straight fronts, and hip reducers is more than ever harmful at this time. If a girl would bear this function easily and later become a good mother, she must be a good animal; she must do more walking, rowing, swimming, and play more open-air games than has in the past been customary with girls, but not during menstruation. During her period a healthy girl should bathe daily, but should be careful that the water is not so cold or the bath so prolonged as to chill her.

Menstruation should be painless, but since we are such imperfect specimens of our race, especially under modern city conditions, it frequently is not. The suffering can often be made less and sometimes can be completely relieved. Girls should promptly consult a trustworthy physician (in most cities there are competent women physicians), and not wait till painful menstruation has become a fixed habit. They should never resort to "patent medicines," some of which are merely worthless, while others contain alcohol and other drugs which work great injury to the body. They should accept menstruation as natural, and never do anything to check it.

The periodic menstruation and ovulation in women cease at an age usually between forty-five and fifty, though frequently outside this range. This time is called the *menopause* or change of life. It is a time of unusual strain, especially in women of a nervous disposition. We should be especially thoughtful to make life easy for our mothers when they are passing through this ordeal.

1. What is menstruation?
2. How is it caused?
3. What has been thought to be the value of menstruation?
4. What precautions should girls observe during menstruation?
5. What can a girl do to make menstruation easy?
6. If a girl suffers from painful menstruation, what should she do?
7. Why should she not use "patent medicines"?
8. What is the menopause?
9. Why ought women to be treated with unusual consideration during their menopause?

The Hymen. — In Figure 16, page 20, you may notice at the opening of the vagina a membrane called the *hymen* or maidenhead. It is sometimes so small as hardly to be noticeable, and sometimes it almost closes the vagina. Since it is usually broken at the first sexual intercourse, its presence intact has been considered the evidence of virginity. The hy-

men is rarely broken by accident or by a physician in operation. When it breaks in sex relation of course it bleeds, an indication to the groom that his bride has preserved her purity. Immoral conduct leaves its evidence on the body. A girl should prize this mark of chastity and guard it from injury.

1. What is the hymen?
2. Why has its presence intact been considered an evidence of chastity?

Perverts and Morons. — There are some persons, usually men, whose sex desires have taken a somewhat unnatural trend and who are therefore called *perverts*. Others have minds so little developed that they lack ordinary self-control and have little moral sense; they are *morons*. Both these classes are a danger to boys and girls. They sometimes entice children who know no better into a secluded place and cruelly mistreat them. Older children they sometimes seize by force and outrage. Boys and girls should both be on their guard against advances from strangers, for they cannot know at sight who are trustworthy. Automobile rides with men or women who are not known to be reliable should especially be avoided. Dangers from these defective people make it unwise for boys or girls to be out in the evening alone or with only an immature companion.

1. In what danger are children from perverts and morons?
2. Why should a boy or a girl refuse to go riding with a strange man or woman, even though the stranger seem respectable and courteous?
3. What danger is there on the streets after dark for boys and girls?

Venereal Diseases. — Immoral relations of men and women have spread throughout the land the germs of several diseases to which the term *venereal* has been applied. Though the germs which cause them may be communicated in other

ways — by public towels and drinking cups, by a kiss, by public closets — they are commonly conveyed from one person to another through sex relations. Comparatively few people outside the medical profession know how widespread these diseases are, what terrible suffering they produce, and what ravages they make in the vigor of the human race.

1. How are venereal diseases most often communicated?
2. How else may they be spread?

Gonorrhea. — One of the venereal diseases, *gonorrhea*, was once thought to be comparatively harmless. It is now known to be one of the worst scourges of mankind, producing in Europe and America more sickness than almost any other disease. In the male organs the germs of gonorrhea get into the urinary and seminal passages, producing pus, whose discharge spreads the contagion. They sometimes cause very painful inflammations and not infrequently deformities that last through life and seriously interfere with urination.

In the female organs gonorrhea does much more damage. The germs find easy passage through the uterus and tubes to the deeper parts of the body. In the tubes and uterus they flourish, producing painful inflammations and generating quantities of poisonous pus. Many severe surgical operations on women are made necessary by gonorrhea germs. They, more than any other cause, render women incapable of bearing children. In many cases, also, they render men incapable of becoming fathers.

A very large per cent of blindness is caused by gonorrheal sore eyes in new-born babes. The germs from the infected mother get into the infant's eyes at birth, and unless the inflammation resulting is promptly and efficiently treated, it is likely to produce blindness. A single treatment of silver nitrate, given promptly, usually cures the trouble. The attending physician or midwife is held responsible by law if through her negligence a baby goes blind.

A young man may harbor gonorrhea germs in his body for months or even years, ready to contaminate the bride who trusts him. A girl risks her life in marrying a man who has not been pure in conduct. The disease under discussion is so widespread, and the innocent have been made to suffer so cruelly from it, that legislators are endeavoring to enact laws that will afford protection to those who suffer through no fault of their own, laws permitting marriage to those only who are physically fit.

1. How serious a menace is gonorrhea?
2. In what ways does gonorrhea injure men?
3. Describe the greater harm done by gonorrhea in women.
4. How does gonorrhea injure new-born babies?
5. What measures are taken to prevent babies becoming blind?
6. How are brides in danger from gonorrhea?
7. What measures have been taken to protect them?

Syphilis. — This disease has been more dreaded than gonorrhea, because its symptoms are more revolting and its effects are more far-reaching; but it is not so widespread as gonorrhea and perhaps does not produce so much suffering and death. The germs of this disease spread in the blood all through the body. The skin is disfigured with eruptions. Large sores difficult to heal often develop, and unless proper treatment is persistently applied for months or years the body may gradually or after a period of several years succumb to a loathsome decay or become paralyzed, or the mind may fail and insanity result.

Children produced while either parent is suffering from syphilis usually contract the disease and die either before they are born or during infancy. If they live, they are often deformed and produce either weak children or none. Children of parents who have recovered from syphilis, though sometimes strong, often bear the effects of the disease — small, fragile teeth, deficient bone growth, and general lack of vigor. The sins of the fathers are visited upon the children.

Syphilis can commonly be cured if treatment is used early and persistently. Patients are tempted to stop treatment as soon as the symptoms of the disease disappear. The first symptoms always disappear in a short time, but the germs of the disease remain. Treatment should be kept up for many months, until the physician pronounces the cure complete. Quack doctors, "men's specialists," are to be avoided more than ever in venereal disease. They commonly claim to have cured a case as soon as the first symptoms disappear. The patient goes on his way, confiding in this false assurance, to be horribly disillusioned when he finds he has infected the bride he has married or when his own health breaks beyond recovery.

Syphilis is more likely than gonorrhea to be communicated through other means than sex relations. In a community where syphilis is common, as it is in all our large cities and in some smaller places, we must cautiously guard our bodies from contamination. At school or on the railway train have your own drinking cup if there is no sanitary fountain. Use your own comb and brush and avoid any towel used in common with others. In public closets take great care that your skin does not come in contact with surfaces that may have been contaminated by diseased persons.

1. Why has syphilis been more dreaded than gonorrhea?
2. How does syphilis affect the body?
3. How does syphilis in parents affect the children?
4. Why do patients so often neglect adequate treatment for syphilis?
5. Why are advertising doctors to be avoided especially in venereal diseases?
6. In what ways other than sex relations is syphilis communicated?
7. Why do some states forbid railways to provide common drinking cups on the cars?

Legal Checks. — Our boards of health, backed by suitable laws, are doing good service in guarding us against smallpox, scarlet fever, diphtheria, and most other contagions, but people suffering from venereal disease commonly go unchecked, spreading their contagion to others, and in most states neither statute nor officer of the law attempts to restrain them. In a few cities immoral women who are found, when arrested, to be diseased (most of them are, much of the time) are confined in hospitals and treated until there is little danger of their spreading their contagion. But their male companions, no matter how badly diseased and dangerous to the community, are rarely held in restraint. In a few states recently doctors have been required to report to the health officer cases of venereal disease, that the patient may be required to take treatment until cured. But the law is poorly enforced. In some states a physician's certificate that the contracting parties are free from venereal disease is required before a marriage certificate is issued, a provision with which every one should gladly comply.

1. What are boards of health doing in some places to check venereal disease?
2. What more should be done to stop the spread of these contagions?
3. In what ways do some states try to protect the family from the ravages of venereal disease?

CHAPTER III

MORAL CONSIDERATIONS

My strength is as the strength of ten
Because my heart is pure. — Tennyson.

I. The Right to Be Well Born

Our Children's Heritage. — Men and women these days are being deeply stirred by a sense of responsibility for posterity. We must see that those who come after us are not deprived, through our wasteful ways, of the materials necessary for their well being — forests, minerals, fertile fields, water power. The permanent structures we erect, the constitution, the governments, and philanthropic and educational institutions we establish, which are changed with such difficulty, should be so planned as to benefit our descendants for many generations. But most of all should we be concerned that our offspring themselves have splendid bodies and noble minds. "To pass on the torch of life not only undimmed, but ever brighter from generation to generation, is the highest service which parents of any generation can possibly render."

1. What natural resources are we using recklessly instead of properly conserving for posterity?
2. Why is it important that our permanent institutions should be established with the thought of their serving those who come after us?
3. What heritage is more important than these public provisions?

Race Decay. — While this sense of duty to posterity is arousing the best people of our time, the human stock in civ-

ilized countries, and especially in large cities, is surely and not slowly deteriorating. Insanity in the United States increases six fold while the population doubles. Deaf-mutism is on the increase, as are also epilepsy, alcoholism, and nervous exhaustion. The torch is being dimmed. How? Those in whom the light of life shines less brightly are producing children, handing their dim light on to the next generation, in which it will become still fainter. For it is the law of life that weak parents produce still weaker children. Salvation to the race can come only by checking reproduction in the weak and stimulating it in the strong.

1. What evidences are there of racial decay in the United States?
2. How can we account, at least in part, for this weakening of our people?
3. How can the decadence be checked?

Hope Ahead. — During the last few years much has been learned about the laws of heredity. It seems as though at last our teaching is established on a firm scientific foundation. By the diligent application of these scientific discoveries we are making wonderful strides in the improvement of cultivated plants and domestic animals. The hope arises that, if we give study and devotion to the production and rearing of children, we can in time bring forth a race of nobler men and women. Such a result is worthy of the utmost endeavor and can be produced only by a thorough consecration to wholesome, ideal living, a consecration such as is shown in conforming to a religious duty.

1. How does the progress made in plant and animal breeding point the way for improvement in the human stock?
2. In what spirit only can we make adequate progress?

Eugenics, Negative. — The work for *eugenics* (well born) takes a negative, and a positive aspect. Negatively our endeavor will be to prevent the propagation of the undesirable. People having transmissible defects should not marry. In

this class are the congenitally deaf and dumb, most of the deformed, the epileptic, the weak-minded, those with insanity which runs in the family, those having grave incurable nervous disorders, habitual drunkards and drug fiends, the syphilitic, those suffering from lead poisoning or tuberculosis.

Our prisons, reformatories, almshouses, and asylums for defectives are largely recruited from the families of such people. State laws are doing something to prevent the marriage of these unfit. But the laws are not enough. The human race cannot attain its highest development until a deep sense of responsibility is awakened in its younger members. They must recognize the fact that they are the guardians of the torch of life. Those unable to hand on the torch undimmed must voluntarily, for the sake of the race, lay aside all thought of matrimony. Marriage should not always follow where love points the way, or if marriage is consummated, it should be so carefully guarded that no unfit children are produced. Renunciation may sometimes be the highest duty of love.

1. What restraining action is necessary to racial progress?
2. What inheritable defects are multiplied by marriages of the unfit?
3. What becomes of the offspring of many defective parents?
4. How can this cankering stream be checked?

Eugenics, Positive. — Concerning the positive aspects of eugenics there is at present too little to say. With regard to the human race the study is just beginning. We do know, however, that the strong body and active mind of the parents are inherited by the offspring. It should add immensely to the interest and conscientiousness with which we care for ourselves, to know that we are providing not only for our own well-being but also for our children and our children's children. There can be no more worthy consecration for a

young man or a young woman than this — to keep himself or herself pure, to train the body to be strong, the mind to be whole, that he may be a worthy father or she a worthy mother of the better race that is to be.

1. What thought of our offspring will give us increased determination to care for our own health?
2. To what social ideal should we all be devoted?

II. Conclusion

We have tried to explain clearly the physiology of reproduction, because we think boys and girls ought to understand the subject; they have a right to know themselves. We have called attention to the particular evils that follow the wrong use of the sex function and to the horrible diseases that are sweeping the land as a result of immorality; we have done this so that you may know something of the enormity of the disaster and may not through ignorance become a victim.

The Controlling Ideal. — Now, in closing, we shall try to set before you an ideal that will be a safe guide in temptation and will bring you the greatest happiness and satisfaction. Common animals feel sexual attraction to their mates only at certain seasons or periods. Then they respond to their instincts without restraint. Adult man is not entirely limited to seasons, but may at any time feel sexual desire, and needs to control his actions by his reason rather than by instincts. The more progressive parts of the human race have for centuries been growing toward the ideal of *monogamy*, one man and one woman married for life. No community has as yet perfectly attained the ideal. But every boy and girl should adopt this as his or her ideal and should firmly resolve to let nothing turn him or her aside from this high aim. The young man expects a pure girl for his bride; the young woman should accept only the chaste man as her suitor.

Fair play is a virtue we value highly. We despise the sneak who tries to get from others what he is not willing to give in return. Only a low-down fellow would come smirched and tarnished to a bride whom he requires to be pure and true. From the time a person is able to understand the meaning of marriage, he should cherish his purity for the one who may in future years join him in wedlock. Maintaining the same ideal of purity for men as for women is what we mean by " the single moral standard," in contrast to " the double standard," which holds girls strictly to chaste conduct while allowing boys to lapse therefrom. Earnest people in America are determined to maintain the single standard.

1. In what way is mankind's sex instinct different from that of animals?
2. This makes necessary what different control of mankind's actions?
3. What does monogamy mean?
4. To what sex ideal should boys and girls be loyal?
5. Explain what is meant by the single moral standard? the double standard?
6. What can you do to help maintain the single standard?

Dragging Others Down. — If a boy (or a girl) should be so reckless as not to care for the sanctity of his own person, let him remember that the stain of vice is not on himself alone. He always drags another into the mire with him. How can one be so blind to the welfare of his fellows as willfully to ruin the life of a companion? The normal and proper function of the sex organs is the production of a child. To indulge the sex function in spite of this almost certain result is not only to wrong oneself and one's partner in vice, but also to fix the disgrace of illegitimate birth on an innocent child. The relation of parenthood, which under proper conditions brings great joy, becomes to transgressors a blight on the lives of those it should bless.

1. Why is one who entices another to vice doubly guilty?
2. How does he wrong an innocent child?

Legal Protection. — Because girls, through ignorance, weakness, or undue complaisance, have often been the victims of unscrupulous men, and because innocent children are made to suffer for the transgressions of their unmarried parents, the law offers a measure of protection (often too slight) to those in need. The offense of begetting an illegitimate child is called *bastardy*. The man who commits the offense can, upon conviction in court, be made to pay for the support of the child. To indulge in sex relations outside marriage is called *fornication* and is a punishable offense. Violation of the marriage vow is *adultery*, legally a more serious offense than fornication. If a man attempts to force a girl or woman against her will, he is guilty of *assault* and can be severely punished. If he succeeds in his attempt, he is guilty of *rape* and he may be sent to prison for years and in some states hanged. If a man has sex relations with a girl who is below the " age of consent," even though she consents or solicits the act, he is guilty of rape and may be punished. The age of consent differs in different states, commonly between fourteen and eighteen years. Under that age a girl is presumed to be unsuited to decide such a matter for herself and must be let alone.

Define each of the following offenses and give the degree of punishment which the law awards each : bastardy, fornication, adultery, assault, rape.

Sex Needs. — Some young men have the notion that they need, for their most complete physical development, to have occasional sex relations with women. Nothing could be farther from the truth. Perfect health is in keeping with perfect continence. In athletic training continence is the strict rule. It is considered one of the conditions necessary to the highest physical vigor. Men come to their marriage in the best sexual state if they have lived chaste lives.

1. Give some evidence that good health does not require sex indulgence.
2. By what kind of life can a man best prepare himself for marriage?

Avoid Temptation. — Young men and young women who have adopted for themselves the ideal of keeping themselves pure for their future mates may fall into trangression through inadvertence. They do not mean to err, but their passion is strong and they are caught off their guard. They do not know how strong their passion is until they are overwhelmed by it. Their safety consists in avoiding temptation. They should take pains to refrain from things which stimulate their passion, from intimacies with the opposite sex, kissing, close embrace in dancing, and the like. The social proprieties are to aid such people in their self-control and should be carefully observed.

1. How do well-intentioned young people sometimes come to transgress?
2. What should they do to guard themselves against the danger?

The bodily union of men and women ought never to be simply the gratification of physical passion: it should come as the most intense expression of a love so devoted that the lovers are ready to give up their lives for each other, or to spend all their years in unselfish service of each other. This ideal of the relation of the sexes should be in the background of the daily life of boys and girls — always there, controlling the actions, requiring courtesy to others and respect of self, but not brought to notice. In fact, to meditate on the bodily relation detracts from the high quality of the love of husband and wife that is to come. Settle the matter once for all, that you will keep yourself fit for the marriage relation by living a chaste life, then put the matter out of your attention and give your thoughts to the cultivation of those qualities which will make you worthy of esteem and love.

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